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## THE UNEQUAL EFFECTS OF COVID-19 ON ECONOMISTS' RESEARCH PRODUCTIVITY

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Keywords: COVID-19, Economics Research, Gender Inequality

# The Unequal Effects of Covid-19 on Economists' Research Productivity\*

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THIS IS A VERY PRELIMINARY VERSION OF AN EVOLVING PROJECT

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## Abstract

The current lock-down measures are expected to disproportionately reduce women's labor productivity in the short run. This paper analyzes the effects of these measures on economists' research productivity. We explore the patterns of working papers publications using data from the NBER Working Papers Series, the CEPR Discussion Paper Series, the newly established research repository *Covid Economics: Vetted and Real Time Papers* and VoxEU columns. Our analysis suggests that although the relative number of female authors in non-pandemic related research has remained stable with respect to recent years (at around 20%), women constitute only 12% of total number of authors working on COVID-19 research. Moreover, we see that it is primarily senior economists who are contributing to this new area. Mid-career and junior economists record the biggest gap between non-COVID and COVID research, and the gender differences are particularly stark at the mid-career level. Mid-career female economists have not yet started working on this new research area: only 12 mid-career female authors have contributed to COVID-19 related research so far, out of a total of 647 distinct authors in our dataset of papers (NBER, CEPR and CEPR Covid Economics).

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\*We are grateful to CEPR for providing data on VoxEU columns, as well as data on submissions to *Covid Economics: Vetted and Real-Time Papers*

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# 1 Introduction

As countries around the world are experiencing dramatic declines in economic activity as a result of the global COVID-19 pandemic, economics research is going through an unprecedented boom. The COVID-19 shock provides economists with a unique opportunity to study the different economic and social implications of the drastic policy measures that were unthinkable only a few months ago. More generally, because of the nature of economics as a discipline and its tightly knit relationship with certain aspects of epidemiology, there is an abundance of new economic research projects to be developed, in almost all subfields of economics.

In this paper, we explore who are the economists that are responding to the big surge in interest and demand for research in relation to COVID-19. Because economics research tends to circulate in the form of working papers well before papers are peer reviewed, it is possible to almost trace in real time how the research activity unfolds. We examine patterns of working papers in economics using data from prominent repositories of early research output and find that the productivity of female and more generally mid-career research economists is disproportionately affected by the lock-down measures. It is primarily senior male economists who are currently working on the wide range of economics research questions arising from the COVID-19 shock.

Our results come from collecting and analyzing titles of papers or research columns, as well as authors' names, from four separate sources. The first two sources are the National Bureau of Economic Research (NBER) Working Papers Series and the Centre of Economic Policy Research (CEPR) Discussion Paper Series. For each of these two, we cover the first four months of the year for the last six years (January to April from 2015 to 2020). The third source is the novel dataset of all submissions to the newly established preprint of *CEPR Covid Economics: Vetted and Real Time Papers*, kindly provided by the CEPR, up until and including Issue 9. Finally, we extract author seniority information from VoxEU columns in the first four months of the last two years (2019 and 2020).

In the first four months of 2020, we found 798 distinct working papers from the first three sources while the four-month average for 2015-2019 has been 606 papers, highlighting a substantial increase in research activity in recent times. Notably, the fraction of female authors in this four-month window of 2020 is almost the same as the last five-year average at approximately 20%. However, women constitute only 12% of total number of authors working on research output related to the pandemic. A further breakdown by seniority suggests that it is primarily senior male economists that are working on this research agenda, while mid-career female economists are absent: out of a total of 647 distinct authors in our dataset of papers, only 12 mid-career female authors have contributed to COVID-19 related research as of the end of April 2020.

The paper is linked to two strands of literature. The first relates to the possible unequal effects of the current lock-down measures on labour market outcomes and labour market productivities for men and women. [Alon et al. \(2020\)](#) carries a detailed analysis using US data and find that compared to other recessions, which affect men's employment the most, the re-

cession caused by the current pandemic is likely to affect sectors that employ mostly women. Moreover, the still unequal division of labour inside households will determine a higher burden on working women due to home schooling and the increase in household duties. However, despite the gloomy short and medium-run forecasts, they envisage possible changes in culture in workplaces and in households that can mitigate the long run effects of the shock. [Adams-Prassl et al. \(2020\)](#) find evidence that, since lock-down measures started, women in the US, the UK and Germany are spending more time on active childcare and home schooling than men.

The second strand of the literature this paper relates to, studies the different constraints and outcomes of female economists in academia over the last twenty years. Women in the economics profession are less productive due to the fact that referees hold women to higher standards and increase the length of the peer-review process (see [Hengel \(2017\)](#) and [Card et al. \(2020\)](#)). Female economists write fewer single author papers and prefer to maintain strong productive ties with a small circle of coauthors ([Ductor et al. \(2018\)](#)). Moreover, the same authors find that women at any seniority usually prefer to write with senior male colleagues. More in general, studies find that women are less likely to be promoted, even conditioning on productivity ([Ginther and Kahn \(2004\)](#)) and hiring tends to be biased towards men ([Williams and Ceci \(2015\)](#)). These and other constraints make female economists underrepresented in the profession reaching, for example, only 29% in the top 100 European economics departments ([Auriol et al. \(2020\)](#)).

In the remainder of the paper, we describe in more detail our dataset as well as our findings, followed by some thoughts about possible explanations of this stark evidence.

## 2 The Data

In order to assess the different productivities of male and female authors we collect titles of papers and columns, names of the authors from four different sources. The first two are the National Bureau of Economic Research (NBER) Working Papers Series and the Centre of Economic Policy Research (CEPR) Discussion Paper Series. For each of these two, we cover the first four months of the year for the last six years (January to April from 2015 to 2020) to avoid seasonal research activity effects. Next, we use a novel dataset of all submissions to the newly established preprint of Covid Economics: Vetted and Real Time Papers, kindly provided by the CEPR, up until and including Issue 9. Last, we extract author seniority information from VoxEU columns in the first four months of the last two years (2019 and 2020).<sup>1</sup>

In total, we analyse 2,361 papers with a total of 6,446 authors from NBER, 1,175 papers with 4,707 authors from CEPR, 129 papers with 240 authors from CEPR Covid Economics and 614 VoxEU columns with 1,611 authors. For more details, please refer to [Table 1 in Appendix](#). To impute the gender of each author, we used the [genderize.io](#) API which assigns gender and a probability indicating the certainty of the assignment. All names that were assigned a gender with a probability less than 70% were checked and assigned manually. Additionally, we checked manually a random sample of 10% of the names with an assignment with probability above

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<sup>1</sup>We included VoxEU columns published until and including 27 April 2020.

70%, to make sure that their genders were correctly imputed.

For the contributors of VoxEU columns, we assign seniority by defining five seniority categories: Ph.D./postdocs, junior, mid-career, senior and others. *Junior* academics include Assistant Professors and Lecturers, *mid-career* academics encompass Associate Professors, Senior Lecturers or Readers, and *senior* academics are composed of professors, full professors or Chaired positions. For non-academic researchers, We use standard metrics of seniority. The last category, “others”, is used for all authors who could not be easily classified.<sup>2</sup>

## 3 Preliminary Findings

### 3.1 CEPR and NBER working papers

When we consider the CEPR and NBER working paper series, in the first four months of 2020, there are 798 distinct working papers, of which a large share appeared in March and April 2020. In contrast, the four-month average for 2015-2019 has been 606 papers, highlighting a substantial increase (of 31.3%) in research activity in recent months. At the same time, the proportion of women contributing to these papers in the four-month window has remained comparable to the last five-year average at approximately 20%.

Figure 1 shows these results including the total number of working papers submitted, the total number of authors and the number of distinct authors. The first author measure, captures productivity by weighing authors’ output by the number of papers they have contributed to. The second measure gives equal weight to every author. We find that the fraction of women measured by either of the two measures is roughly the same (see Table 2 in the Appendix).

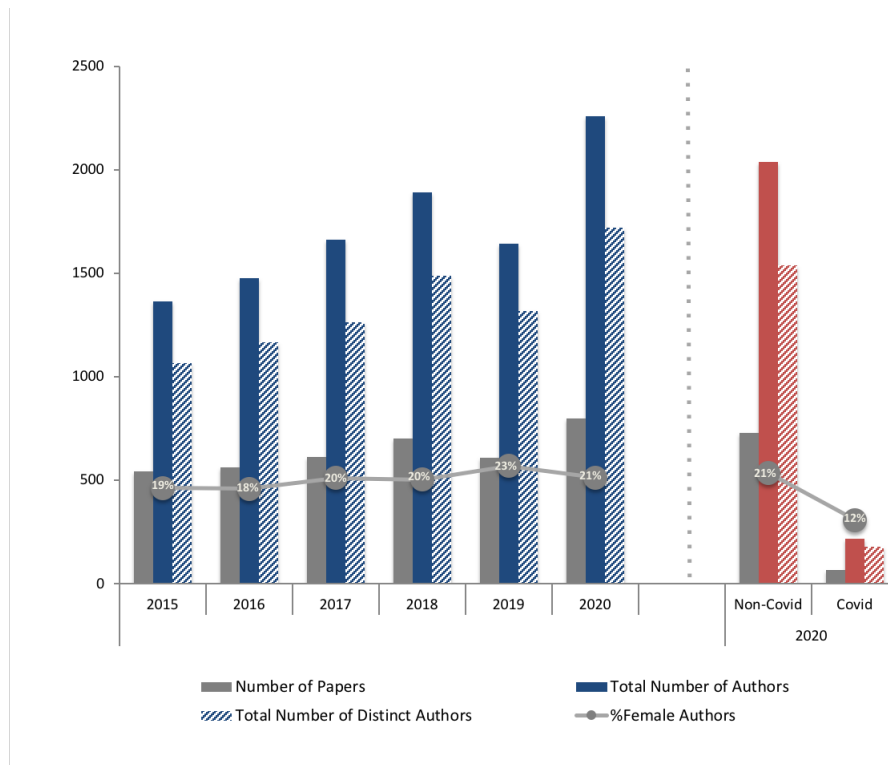
Looking at the last four months, we identify the papers that have been submitted recently and classify them according to their topic: non COVID-19 and COVID-19 related research. The results are summarised in the last columns of Figure 1. Interestingly, when we compare the figures of the last five years with the first four months of 2020, the relative number of female authors in non-COVID research has remained stable with respect to recent years. In contrast, women constitute only 12% of total number of authors working on COVID-19 research. These facts suggest that while female researchers have managed to continue working on ongoing research and keep up with the recent growth of research activity, they have been less willing or less able to contribute to the budding literature on the economics of pandemics. This seems to be in contrast to the findings of the editors of some prominent economic journals such as the Review of Economic Studies and the Journal of European Economics Association. Both editors find that there has been a decrease in paper submissions by women.<sup>3</sup> We should keep in mind, however, that the economists that publish in the NBER and CEPR working paper series are

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<sup>2</sup>This group includes positions such as *Member of the European Parliament*, *Member of the Advisory Council*, *independent researchers*, *economists at Banks such as Goldman Sachs* and so on for which drawing parallels with academic seniority seemed difficult.

<sup>3</sup>Fuchs-Schundeln (2020) reports preliminary statistics from ReStud submissions in 2020 and Imran Rasul, editor of JEEA, tweeted on 24/04/2020 that ‘*share of women submitters falls from 28 to 16%*’

Figure 1: NBER and CEPR WP Series



Source: NBER, CEPR, and authors' calculations.

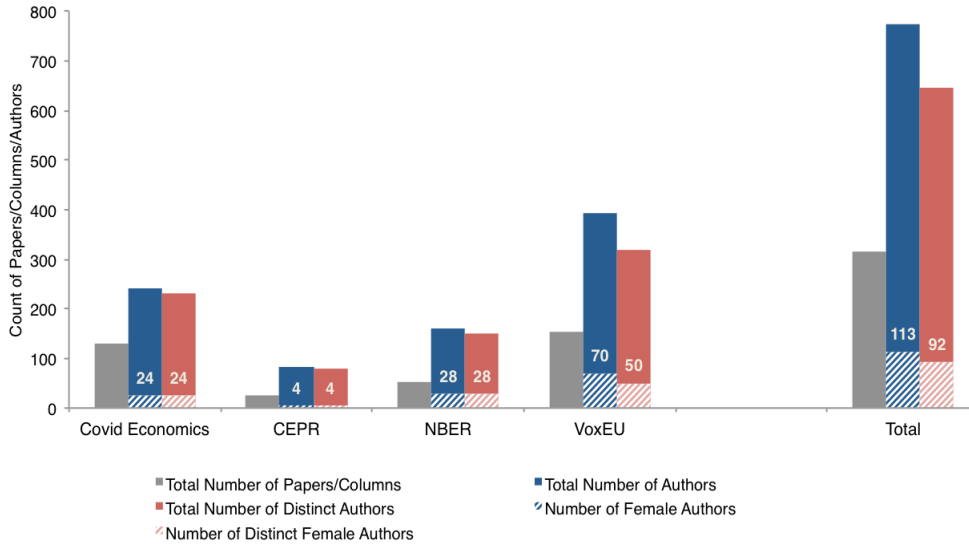
a selected sample as at least one of the coauthors must be a member of the NBER or CEPR respectively.

### 3.2 Focusing on COVID-19 research

Next, we focus exclusively on COVID-19 related research and use two additional data sources, the repository *CEPR Covid Economics* and the VoxEU columns. With these data, the results become starker (Figure 2). As a fraction of all authors, women constitute 17.4% for NBER working papers, 4.8% for CEPR working papers, 10% in the papers submitted to *CEPR Covid Economics* (with only 6.8% for papers that have been accepted and published as of 26 April 2020) and 17.8% in VoxEU columns.<sup>4</sup> Combining all our data sources and removing work that appears in more than one outlet, the proportion of female authors working on research related to the pandemic is 14.6%.

<sup>4</sup>The large difference of share of females between the NBER and CEPR working paper series may be due to the fact that CEPR also publishes *Covid Economics*. This online repository collects and publishes formal investigations of the COVID-19 crisis, based on theory and empirical evidence. Submitted papers go through a fast track peer review process by the editorial board and can only be accepted or rejected. This means that papers do not go through the usual lengthy revision process of journal publications. Also, authors do not have to be affiliated to CEPR, which is a requirement for submitting papers on CEPR working paper series.

Figure 2: Breakdown of COVID research activity by source and gender



Note: Numbers in white are numbers of female authors. *Source:* VoxEU columns and authors' calculations.

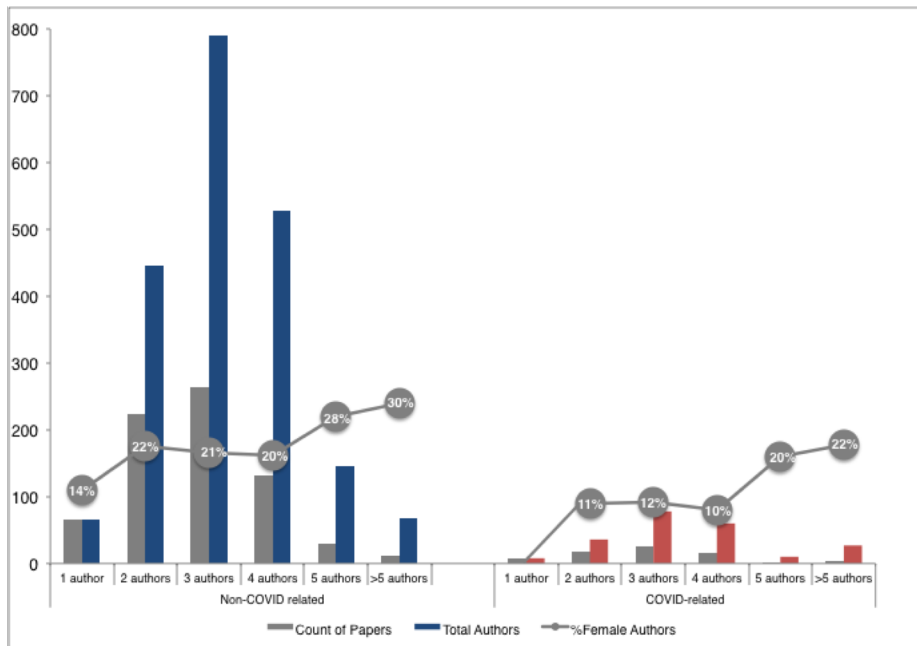
### 3.3 Co-authorship patterns

For a richer analysis of economists' research productivity, we analyze co-authorship patterns of NBER and CEPR working papers between 2015 and 2020. We notice that women tend to be more present in co-authored papers than in solo-authored ones, confirming the analysis of [Ductor et al. \(2018\)](#). Out of 433 solo-authored papers submitted in the first four months of the past 6 years, only 12.5% were by female authors. However, this number increases to 19.4% for papers with 2 authors, 20.3% for papers with 3 authors, 21.6% for papers with 4 authors, 20.8% for papers with 5 authors, and 26.5% for papers with more than 5 authors.

In order to better understand the micro-underpinnings of the recent increase in economists' research productivity, we focus on the first four months of 2020 and look into the co-authorship patterns of COVID-19 related and unrelated papers. [Figure 3](#) shows stark differences in female shares across co-authored groups between the two research topics. Female economists contributed to 13.6% of the solo-authored non-COVID related papers, but had no contribution to COVID-related solo-authored papers. More interestingly, for every network size of co-authors, the contribution by females is higher in non-COVID papers than in COVID-related papers.

[Figure 3](#) also shows that papers written by two, three and four authors constituted the lion's share of the research disseminated in 2020 (85% of non-COVID papers and 81% of COVID-related papers). While female economists constituted 20.9% of the 618 non-COVID related papers in these 3 categories, they constituted *only* 10.9% of the 59 COVID-related papers coauthored by two, three and four economists.

Figure 3: Co-authorship Patterns in NBER and CEPR WP in 2020



Source: NBER, CEPR, and authors' calculations.

### 3.4 Seniority analysis

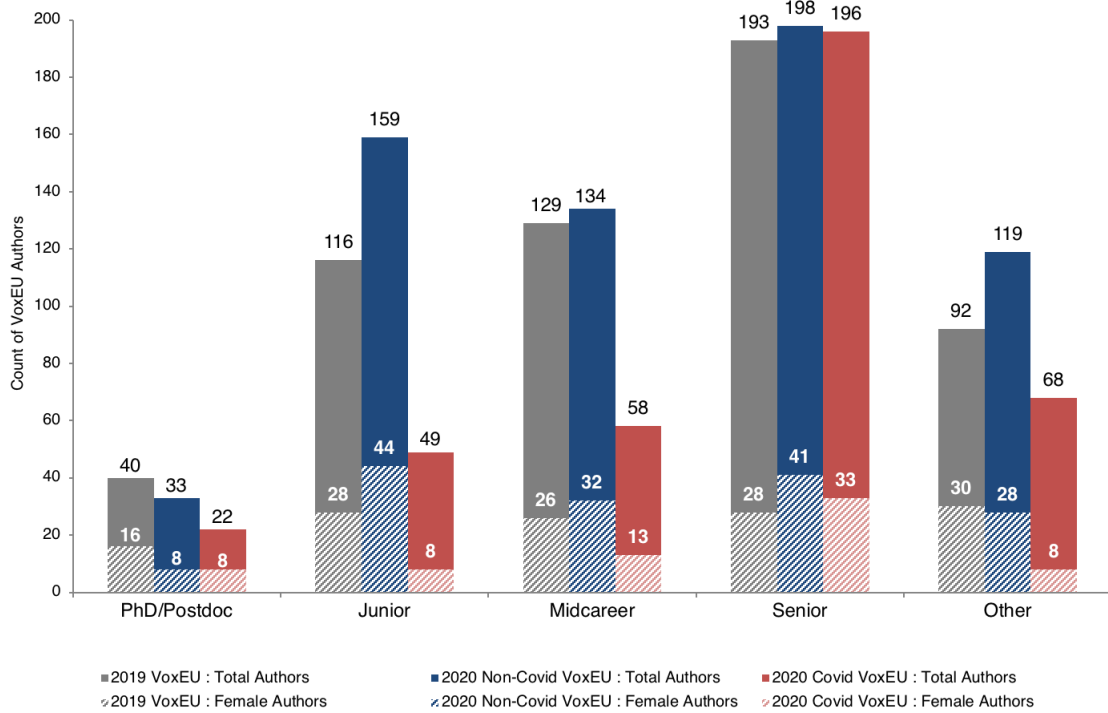
It is interesting also to explore another dimension of the data available: the seniority of the authors. Considering only the recent COVID-19 research in our dataset, we find that it is primarily senior economists who are contributing to the discussion of this research and policy area. Meanwhile, mid-career and junior economists record the biggest gap between non-COVID and COVID research, and additionally the gender differences are particularly striking at the mid-career level. Mid-career female economists have not yet started working on this new research area: only 12 mid-career female authors have contributed to COVID-19 related research so far, out of a total of 647 distinct authors in our dataset of papers (NBER, CEPR and CEPR Covid Economics).

As a comparison, we analyze the seniority of the contributors of the VoxEU columns. VoxEU columns showcase new research or provide summaries and opinions about ongoing research. The authors of the columns do not have to be the authors of new research papers on the topic. This analysis could give us a proxy on how engaged economists are in new research discussions.

Figure 4 shows seniority breakdowns for contributors to VoxEU columns in the first four months of 2019, as well as contributors to VoxEU columns unrelated to the pandemic, for the first four months of 2020. These numbers highlight even more the absence of junior, mid-career and female researchers from COVID-19 discussion.



Figure 4: VoxEU authors by seniority and gender



Note: Numbers in white are numbers of female authors. *Source:* VoxEU columns and authors' calculations.

### 3.5 Webinars

In addition to capturing research productivity through analyzing trends in working paper series, economists (like many other academics) also set up webinars to encourage cross-institutional economics discussions whilst in lock-down. Two particularly popular and high quality economics webinar portals that emerged are the *Virtual Macro Seminar Series (VMACS)* and the *Health and Pandemics Econ Working Group (HELP!)*. The majority of the papers presented in these webinars is already included in our working paper analysis, yet it is still interesting to see the contribution of female authors to these webinars. VMACS set up 13 seminars between end-March and end-April 2020. Of the 35 authors involved in the presented papers, only four are women. In the same period, it is interesting to see that only one VMACS webinar was delivered by a woman, and the paper presented was not COVID-related. Meanwhile, *HELP!* organised ten seminars during the same time period, of which only one was delivered by a woman. The ten papers presented at the *HELP!* seminars were by 27 authors, of whom four were women.

## 4 Interpreting the findings

A first conclusion from our data analysis is that economic research is experiencing an unprecedented boost. New research papers are produced almost daily. Women authors seem to have

continued working on non-COVID-19 research, but have been less willing to engage in this new research area. The few women who have started new research on the effects of the pandemic appear to prefer working in co-authorship groups more than their male counterparts and they collaborate with more senior colleagues on average.

The current research and policy debate is more and more turning focus on the unequal impact of lock-down measures on the households and the general economy. Newspapers are inundated with articles describing the struggle of parents who have to juggle a career and a family in these non-ideal conditions.<sup>5</sup> In our analysis junior and mid-career female economists are more likely to be heavily involved in both professional and administrative (i.e. non-research related) duties, while also probably tending to families with young children during the pandemic lock-downs.

However, the economic literature provides additional explanations in the inherent differences between the research approach of female and male academics. Female academics are more risk averse and may be less willing to start new projects in such a short notice, especially if the topic is inter-disciplinary.<sup>6</sup> All the above may preclude them from investing in new high-cost research as opposed to finishing off work-in-progress, for which most of the fixed cost had been incurred already before the pandemic. This is particularly noticeable from the absence of female authors in single authored COVID-related research in our dataset. Moreover, a recent volume published by VoxEU ([Lundberg \(2020\)](#)) offers a summary and explanations of known factors that contribute to the productivity gap between female and male economists. In particular, it is generally known that female academics tend to produce fewer papers than men. [Hengel \(2017\)](#) argues that female economists face a trade-off between quality and quantity due to higher standards demanded of female authors. This makes them spend more time on reviewing and polishing older research than on generating new ideas, in line with the current experience of research on the economics of COVID-19. [Ductor et al. \(2018\)](#) in the same research show that female authors prefer co-authorships to single-authored papers. Men and women have different co-authorship networks. On the one hand, men have more groups of co-authors and produce more single-authored papers. On the other hand, women prefer to maintain the same small number of co-authors that is persistent over time.

## 5 Conclusion and work-in-progress

The COVID-19 crisis has spurred a fast-growing new field in economic research. Female economists have not been as fast in reacting to the new research challenge as their male counterparts, and this seems to be due to a combination of unfortunate coincidences. The adverse effects of lock-downs on division of labour at home may have been detrimental to the research

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<sup>5</sup>For example, [Minello \(2020\)](#) offers a humorous but vivid commentary on the life of the female academic during lock-down.

<sup>6</sup>The behavioral literature shows that there is a wide range of experimental and survey evidence that supports the view that women are less willing to take risk, and they are also more averse to uncertainty, than men (e.g. [Eckel and Grossman \(2008\)](#)).

activity of all parent mid-career economists and especially women. In addition, women are inherently more averse to risk and undoubtedly more cautious about how they approach research. Therefore, it seems that whenever they can set aside time to work on their research, it is largely devoted to completing well-developed work within their comfort zone.

Going forward, we will continue to update and analyze these datasets along the lines presented herein for the next months and to include also more years predating 2015. The evidence shown here could be only a temporary shock and in the next months we may see a convergence to previous years averages. Alternatively, this may be a more persistent shock that will cause long lasting effects on the productivity gap. Moreover, we are looking at the effect on different research fields sorting our papers by JEL codes and for the NBER working papers, by research themes. This will allow us to determine if some economic fields have been more affected than others.

The current analysis gives a preliminary understanding of the effects of this unprecedented shock on the gender productivity gap in general. This evidence could provide the first input to design policies that will address the consequences of this unequal shock. In the literature review, we have provided a long list of all the evidence available showing possible obstacles to female academics. It is possible that these circumstances will tighten these constraints even more, and have long-lasting effects on female career progression. These effects need to prompt policies that address and reverse these outcomes.

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## Appendix

Table 1: Summary Statistics

	NBER		CEPR		CEPR Covid Economics			VoxEU Columns	
	Avg[2015-2019]	2020	Avg[2015-2019]	2020	Total	Accepted	Rejected	2019	2020
Number of papers/columns	380	461	274	403	129	55	74	217	397
Number of authors	1026	1318	713	1144	240	118	122	571	1040
%Female authors	20.5%	21.2%	19.8%	19.5%	10%	6.8%	13.1%	22.6%	21.4%
Number of non-COVID papers/columns	380	407	274	379				217	244
Number of authors	1026	1157	713	1061				571	643
%Female authors	20.5%	21.8%	19.8%	20.6%				22.6%	23.8%
Number of COVID papers/columns	0	54	0	24				0	153
Number of authors	0	161	0	83				0	397
%Female authors	0	17.4%	0	4.8%				0	17.6%

Table 2: Comparing Two Female Authorship Measures in CEPR/NBER Working Papers

	%Female out of total authors	%Female out of distinct authors
2015	19%	20%
2016	18%	19%
2017	20%	21%
2018	20%	22%
2019	23%	23%
2020	21%	22%
2020 non-COVID	21%	23%
2020 COVID	12%	15%